(No Model.)

A. J. STEWART.

AUTOMATIC GAS REGULATOR.

No. 332,568. Patented Dec. 15, 1885.

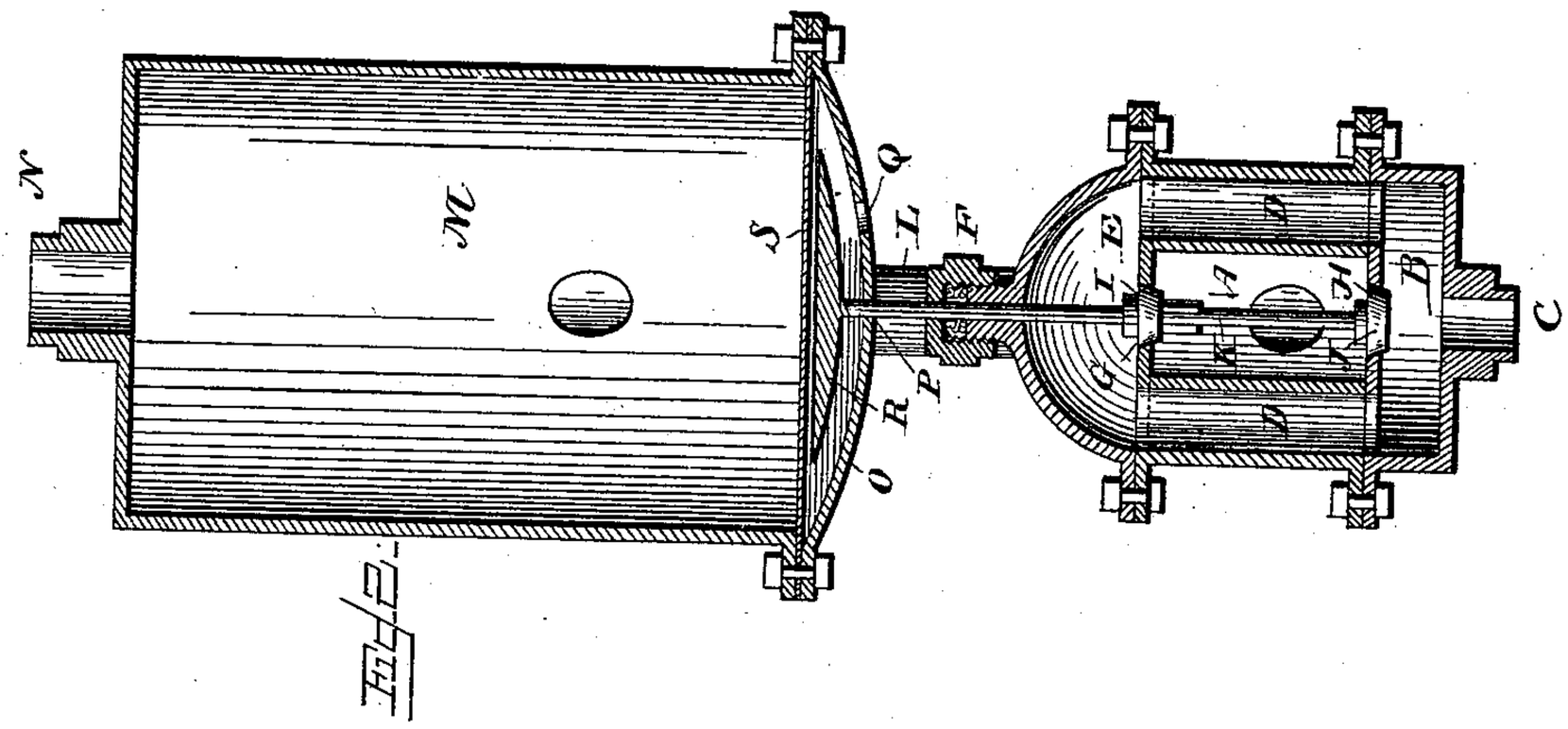

Fig. 2.

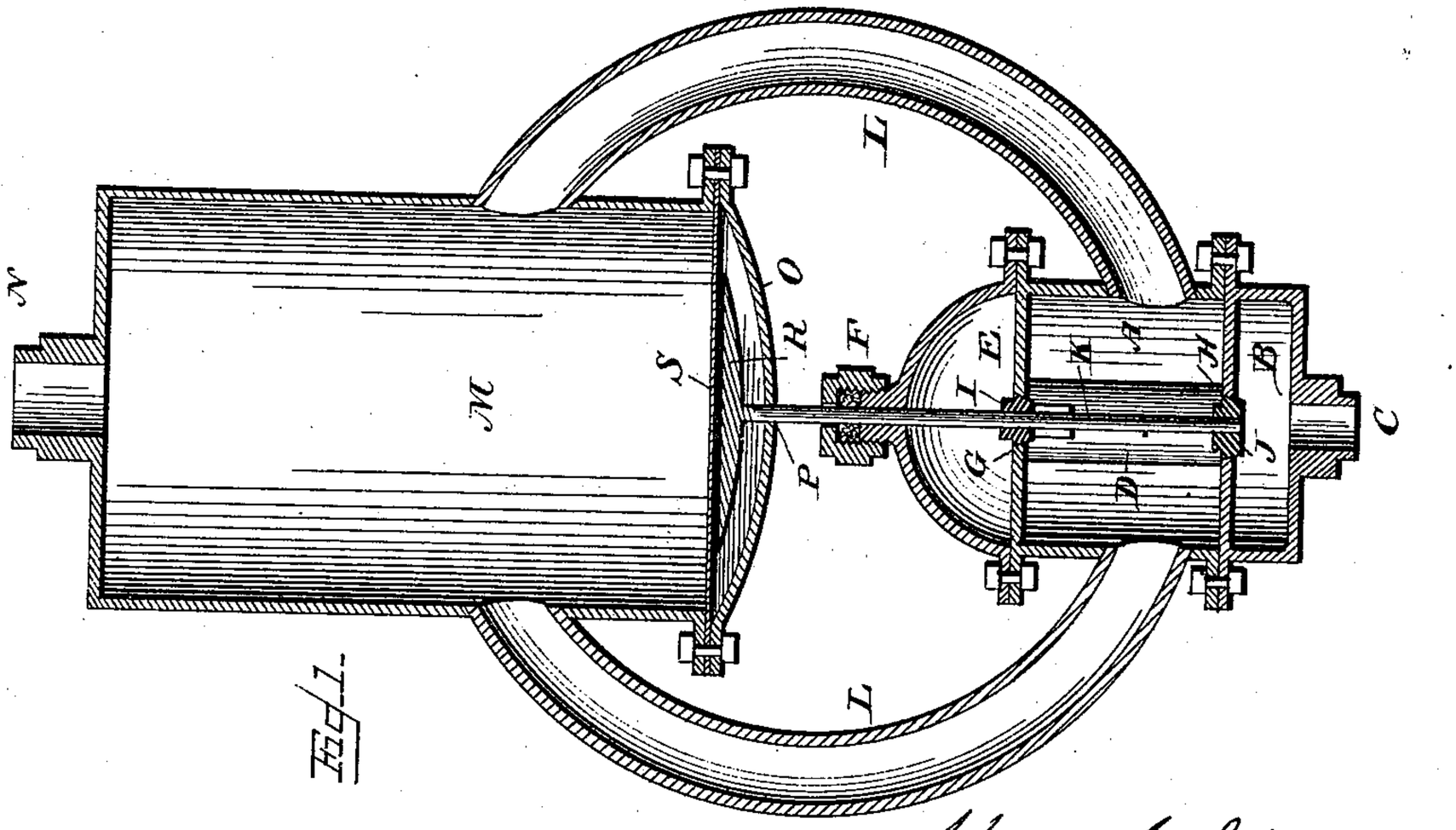

Fig. 1.

WITNESSES.
F. L. Ourand.
Edward Stanton

Alvin J. Stewart
INVENTOR
By Louis Bagger & Co
Attorneys.

UNITED STATES PATENT OFFICE.

ALVIN J. STEWART, OF BLUFFTON, INDIANA.

AUTOMATIC GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 332,568, dated December 15, 1885.

Application filed November 2, 1885. Serial No. 181,684. (No model.)

To all whom it may concern:

Be it known that I, ALVIN J. STEWART, a citizen of the United States, residing at Bluffton, in the county of Wells and State of Indiana, have invented certain new and useful Improvements in Automatic Gas-Regulators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a vertical sectional view of my improved fluid-pressure regulator, and Fig. 2 is a similar view taken at right angles to the same.

Similar letters of reference indicate corresponding parts in both the figures.

My invention has relation to pressure-regulators for fluids, and more particularly to devices for decreasing the pressure of fluids; and it consists in the improved construction and combination of parts of such a device in which a fluid may enter the apparatus at a high pressure and may leave the apparatus at a low pressure, as hereinafter more fully described and claimed.

Although this apparatus may be used for regulating the pressure of any fluid, it is principally designed to reduce the pressure of natural gas, as it comes from the well under too high a pressure to be conveniently conveyed in pipes or advantageously burned, and by the use of my apparatus the pressure may be reduced from a pressure of one thousand pounds to the square inch down to a pressure of two ounces to the square inch, as proved by actual test, thus rendering it possible to adjust the apparatus to a main from a natural-gas well and reduce the pressure of the gas to a convenient and practicable pressure, which will not endanger the safety of the place where it is used or of the persons using the gas, besides rendering it more easily portable without the necessity of using extra-strong pipes for conveying it.

In the accompanying drawings, the letter A indicates the lower low-pressure cylinder, to the bottom of which is secured the lower high-pressure cylinder, B, into which the inlet-pipe C enters at its bottom. This lower high-pressure chamber communicates, by means of two tubes, D D, passing through the low-pressure chamber, with the upper high-pressure chamber, E, which is preferably formed in the shape of a cupola, and which is provided with a suitable stuffing-box, F, in its top. The upper sides of the top and bottom of the low-pressure cylinder, and consequently of the bottom and top of the two high-pressure chambers, are formed with registering valve-seats G and H, the upper seat being of a smaller diameter than the lower seat, and both seats having their edges beveled, and two valves, I and J, fit upon these seats and are secured upon a common valve-stem, K, passing up through the stuffing-box in the top of the upper high-pressure chamber. The sides of the low-pressure cylinder have two curved pipes, L L, entering them at opposite sides, and the upper ends of these arms enter the upper low-pressure cylinder, M, the top of which has the outlet-pipe N secured in it. The bottom O of the said low-pressure cylinder is bulged downward and has an aperture, P, in its center, through which the valve-stem passes, the said aperture registering with the stuffing-box and another aperture or air-inlet, Q. The upper end of the valve-stem inside of the bottom of the cylinder is formed with a flat disk, R, and a flexible diaphragm, S, is stretched at the lower end of the cylinder above the downwardly-bulged bottom.

It will now be seen that the gas under high pressure enters the lower high-pressure chamber, and from it passes to the upper high-pressure chamber through the connecting-tubes. This will cause an equal pressure upon both valves—an upward pressure upon the lower valve and a downward pressure upon the upper valve; but the lower valve being larger, it will overcome the pressure upon the upper valve and raise the valves, allowing a quantity of gas to enter the low-pressure chamber. From this the gas will pass through the curved arms or pipes into the upper low-pressure cylinder, and the moment the pressure of the gas in this cylinder exceeds the desired height the diaphragm will be depressed and the disk upon the valve-stem be depressed, reseating the valves and closing the supply off until the pressure in the upper low-pressure cylinder decreases sufficiently to

allow the valves to be again raised, when the gas may again enter, and so forth continually, as long as there is a flow of gas.

It will be seen that if the valves were of the same diameter the upward pressure of the gas could not overcome the equal pressure of gas downward upon the equally-large valve; but the lower valve being larger than the upper valve, the equal pressure upon the larger lower valve will overcome the equal pressure upon the smaller upper valve, and thus raise the valves; and it will be seen that the pressure in the upper high-pressure chamber will aid in retaining the valves upon their seats against the strong pressure of the gas entering the inlet-pipe, enabling the low pressure in the upper low-pressure cylinder to close the valve against the strong pressure in the high-pressure chambers.

By having a lower valve considerably larger than the upper valve the gas passing out at the outlet will be very slightly reduced in pressure, compared with the gas entering at the inlet, the upward pressure of the gas overcoming easily the downward pressure; but when the valves are very nearly of the same size, the lower valve being only slightly larger than the upper valve, a greater pressure is required to open the valves, and consequently the gas passing out of the apparatus will be at a greatly-reduced pressure, compared with the gas entering the apparatus at the inlet.

As before stated, the apparatus may be used to regulate the flow of any fluid, gaseous or non-gaseous; but the apparatus is principally intended for reducing the pressure of natural gas coming out of the well, bringing the said gas from a dangerous and inconvenient height of pressure to a convenient and safe height of pressure, rendering the gas more tractable and transportable.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

In a fluid-pressure regulator, the combination of a lower high-pressure chamber having an inlet-pipe and a valve-seat upon the upper side of its top, an upper high-pressure chamber having tubes communicating with the lower chamber, and a stuffing-box in the center of its top, and provided with a valve-seat in the upper side of its bottom, registering with the lower seat and with the stuffing-box, and of a smaller diameter than the lower seat, a low-pressure cylinder secured between the chambers and having outlet-apertures in its sides, an upper low-pressure cylinder having an outlet-pipe in its top, and having a downwardly-bulged bottom provided with a central aperture and with an air-aperture, and provided with curved pipes entering the apertures of the low-pressure cylinder, a diaphragm stretched at the lower end of the upper low-pressure cylinder above its bottom, and a valve-stem having valves fitting upon the seats of the high-pressure chambers, and having its upper portion passing through the stuffing-box of the upper chamber and the aperture in the bottom of the upper cylinder, and provided with a disk at its upper end bearing against the under side of the diaphragm, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

ALVIN J. STEWART.

Witnesses:
LOUIS BAGGER,
AUGUST PETERSON.